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The New England Botanical Club, Inc.

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 50. February, 1948. No. 590.

LESPEDEZA STRIATA AND L. STIPULACEA[1]

DUANE ISELY

(Plates 1091 and 1092)

Lespedeza is primarily a genus of perennials (herbaceous or shrubby). The lespedezas occurring in North America, however, include two annual species, *Lespedeza striata* (Thunb.) Hook. and Arn. and *L. stipulacea* Maxim. Both are introduced from eastern Asia and are widely cultivated in this country; both have escaped extensively and in the South are a conspicuous element of roadside, pasture, and wasteland flora. Of these two, *L. striata* only is treated in such manuals as have come to my attention, with the exception of Deam's Flora of Indiana where the two species are differentiated only on the basis of a pubescence character. It seems desirable to call attention to the widespread naturalized occurrence of *L. stipulacea* in certain areas of the country and to point out distinguishing characteristics between it and its better known congener. A brief review of important items in the botanical history of these two plants is also presented.

The name *Hedysarum striatum* was originally applied by Thunberg in 1784.[2] The plant concerned was doubtfully placed in the genus *Desmodium* by DeCandolle,[3] and was transferred to

[1] In the course of preparation of even a short item such as this I have become indebted to several individuals for aid in obtaining literature and for suggestions made. Sincere thanks are offered. Particular acknowledgment is due CHARLES L. GILLY, who, in addition to making numerous constructive comments, prepared the included drawings.

[2] Fl. Jap. 289. 1784.

[3] Prodromus 2, 337. 1825.

Lespedeza by Hooker and Arnott.[4] I have not seen Thunberg's material, which is presumably in Upsala, nor have I seen literature references indicating that anyone else has checked the current application of this name. The original description is somewhat ambiguous. It is, in general, referable to, if not specific for, *L. striata* as we understand it today. The leaflets, however, are described in part as follows: "Foliola oblonga, obtusa, subretusa, setula acuminata . . . glabra linea dorsali pilosa." Oblong leaflets are distinctly characteristic of *L. striata.* The subretuse tip and dorsal pilose line are, however, scarcely to be noted for this species; they are, on the contrary, markedly characteristic of *L. stipulacea* (See Plate 1092). It is possible that Thunberg's specimens consisted of a mixture. Further comment upon this problem cannot be made until type material is available.

Maximowicz's *L. stipulacea* was described in 1859.[5] The description is quite lucid, clearly referring to the plant now known under that name. Maximowicz also enumerates certain distinctions between his plant and *L. striata.* In subsequent Asiatic and European literature, however, these two species are much confounded. In some treatments they are maintained separately and in others regarded as synonyms. Maximowicz, himself, threw his plant into synonomy under *L. striata* in 1873.[6] *Kummerowia,* described by Schindler in 1912,[7] consists of a segregate genus based upon these species. Schindler distinguishes this genus from *Lespedeza* on the basis of the annual habit, leaf phyllotaxy, and certain characteristics of the inflorescence and fruit. However, while recognizing a "micro-genus" he did not distinguish between the two species; *L. stipulacea* Maxim. is listed as a synonym under *Kummerowia striata* (Thunb.) Schindl.

Relative to the application of the names in North America, Asa Gray[8] appears to be responsible for originally identifying the "Japanese Clover", introduced earlier in the 19th century, as *L. striata* (Thunb.) Hook. and Arn. Pieters and Van Eseltine[9] report as *L. stipulacea* Maxim. the "Korean lespedeza" introduced by the U. S. Department of Agriculture. They also point

[4] Bot. Beech. 262. 1841.
[5] Prim. Fl. Amur. 85. 1859.
[6] Act. Hort. Petrop. 2, 382. 1873.
[7] Fedde, Rep. 10, 403. 1912.
[8] Am. Nat. 1, 495. 1867.
[9] U. S. D. A. Dept. Circ. 317. 1924.

out certain characters useful in differentiating this species from *L. striata*. Reference is frequently made to their paper by agronomists, but it has been largely ignored by taxonomists.

The present note treats these annual lespedezas as being two superficially similar but amply distinct entities in the genus *Lespedeza*. The confusion in the literature concerning the identity of these plants and the frequent relegation of *L. stipulacea* to synonymy probably should be attributed to non-critical observation; this viewpoint will be substantiated by data given in the latter portion of the present paper. Relative to the generic position of these plants, it is granted that they should doubtless be considered a distinct section of the genus, but Schindler's generic segregation cannot be accepted.

The time and place of the introduction of *Lespedeza striata* upon the North American continent are problematic. The earliest printed reference which I have seen pertains to a collection of this plant near Monticello, Georgia, made in 1846.[10] Early records indicate that the plant was well distributed over the southeastern portion of this country by the time of the Civil War. Attention was soon drawn to its value for pasturage; hence its subsequent employment as a cultivated plant. The story of *L. stipulacea* is the converse of the above. It was brought to this country in 1919 specifically for trial as a cultivated plant and has subsequently become established as an escape from cultivation. The original introduction was by seeds sent from Korea to the U. S. Department of Agriculture in Washington.[11] It is, of course, possible that, like *L. striata*, the plant was previously present in the United States, but there appears to be no definite evidence to this effect.

The range of these two plants in this country today is essentially equivalent to the areas in which they find agricultural employment. *L. striata* is a bit the more southern of the two. It reaches central Missouri, southern Illinois, and Indiana as a northern limit and extends west into eastern Kansas and Oklahoma, south and east to the Gulf and Atlantic coasts. *L.stipulacea* is present from central Iowa eastward to Pennsylvania and south to central Alabama and Georgia. Its western limits

[10] Porter T. C., Am. Nat. 2: 39. 1868.
[11] Pieters and Van Eseltine, l. c.

are approximately the same as for *L. striata.* However, the recent introduction of varieties of *L. stipulacea,* which will set seed in Canada, suggests that it may in time become naturalized in more of our north central and northeastern states.

These two plants, particularly *L. striata,* possess tendencies characteristic of polymorphic species, displaying considerable variation in habit, leaflet shape, and pubescence; considerable physiological divergence is likewise exhibited in the varied degrees of adaptation of different varieties or strains to agronomic application in different agricultural regions. To some extent this aspect of natural variability is, perhaps, spurious, being the result of intercrossing between escapes representing various strains which have been selected out of the original population by man. It is entirely possible that the plant populations are much more uniform in their native habitats. In this country, *L. striata* is represented by three principal cultivated forms or varieties (in addition to numerous other less widespread selections). These are known as Common lespedeza,[12] Kobe lespedeza, and Tennessee 76. Kobe lespedeza possesses a certain degree of morphological differentiation relative to the other two forms, being larger, coarser, and more pubescent. The calyx-lobes are sparsely grey-pubescent in contradistinction to the glabrous or merely ciliate calyces of the Common lespedeza, and the loment and seed are markedly larger. It is neither one of, nor derived from, the *L. striata* strain or strains originally introduced into this country but has been recently (1920) brought in from Kobe, Japan. As to the possible varietal significance of Kobe lespedeza, recognition of such would scarcely seem to be justified, at least on the basis of its morphological characters alone, these being concerned primarily with size and pubescence. If, however, in its native habitat Kobe lespedeza represents a more or less definitive plant population possessing certain geographical or ecological characterizations in contrast to the other forms of this species, nomenclatural consideration as a variety might be in order. This, however, would not seem justified on the basis of its role in this country and cannot be considered in this present paper in the

[12] This plant in the past has been widely known under the appellation of "Japanese Clover" and is so designated in many of our manuals. This name has, however, been replaced almost entirely in common usage and in agronomic nomenclature by the perhaps more appropriate "Common lespedeza."

absence of data concerning its Asiatic distribution and variability.[13]

Tennessee 76 is a strain selected from parent stock of *L. striata* in this country. The plants are characteristically more erect-growing and larger than those of Common lespedeza but appear to have no definitive morphological distinctions of taxonomic significance.

L. stipulacea is known in this country under the names of Korean lespedeza and Harbin lespedeza. Korean lespedeza is represented by several selections such as Improved Early Korean and Late Korean. These forms have been synthesized from stock derived from the original introduction; none of them appear to have any distinctions of taxonomic significance. Harbin lespedeza, however, represents a separate introduction of this plant from Harbin, Manchuria. This plant is adapted to much shorter periods of vegetative growth. It is a smaller, more sparse plant than typical Korean lespedeza and may possess other characters indicative of varietal distinctness.

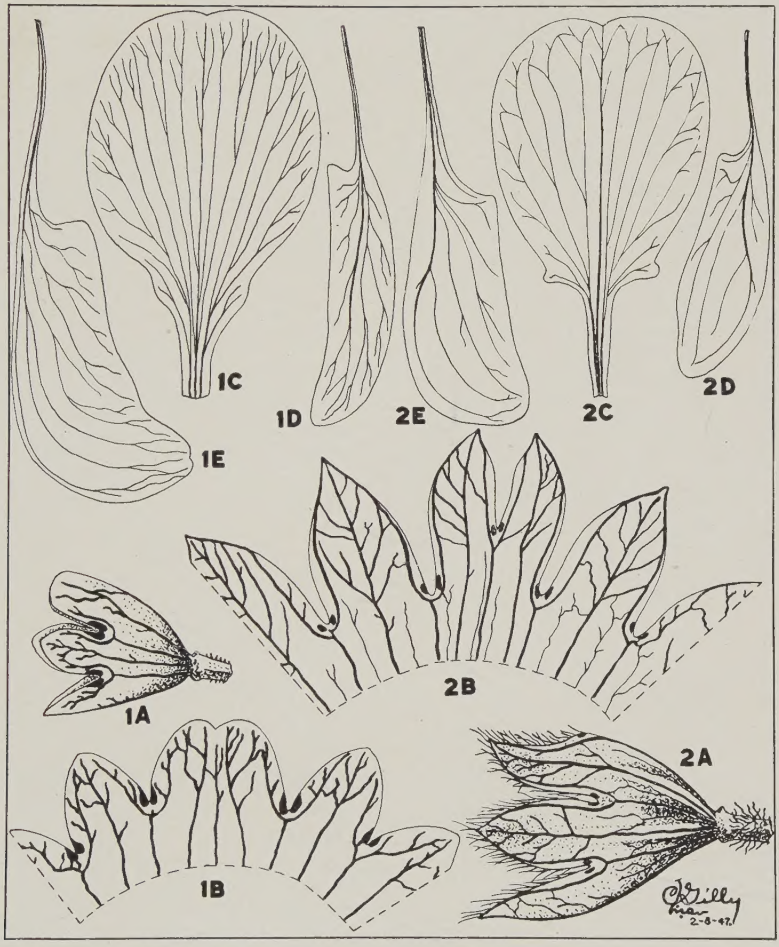
The most easily observed, but not invariably reliable, differences between the two species under discussion have to do with habit, petiole-length, and leaflet-shape, the most critical diagnostic distinctions are concerned with configuration of the calyx, loment, and seed. These and other helpful characterizations are presented in tabular form below. No attempt is made to give complete descriptions of these plants; only those characters wherein the species have been observed to differ are discussed.

[13] Relative to the much-discussed problem concerning the advisability of giving recognition in the language of scientific nomenclature to various morphologically distinct, cultivated agronomic and ornamental plants, it might be commented that the element of time as well as that of structural discontinuity should be considered. I have heard it maintained that "varieties" and "strains" of many of our cultivated plants (particularly ornamentals) possess a much greater morphological divergence than do many "natural" varieties and subspecies. This is undoubtedly true—it is likewise true that many so-called varieties and subspecies should scarcely be recognized as such. Cultivated varieties, however, are apt to be ephemeral things; they are fancied for a few years and then dropped, as something better comes along, disappearing forever in oblivion. Being almost entirely dependent upon the hands of man for the maintenance of their genetic distinctness, they are in no way comparable as a definite biological entity to a self-perpetuating varietal or subspecific population with an established (albeit probably changing) ecological or geographical range. This generalization would seem to be applicable even if the morphological characters of the "natural unit" are rather weaker than those of the man-made "toy."

PLANT-CHARACTER	L. STRIATA (Thunb.) H. & A.	L. STIPULACEA Maxim.
HABIT[14]	Prostrate or spreading, or, in close stands, ascending to erect, scarcely exceeding 20 cm. in height, diffusely branched.	Similar to *striata* but commonly taller and in dense stands, frequently scarcely branched.
STEM-PUBESCENCE	Downwardly appressed, in several lines, or covering nearly entire surface of stem.	Upwardly appressed or somewhat spreading, frequently only in one or two lines on stem angles.
LEAVES		
Petiole-length	1–2 mm., uncommonly 3–5 mm.; leaves usually appearing subsessile.	4–10 mm. on main stems but frequently shorter on ultimate branchlets; leaves mostly appearing distinctly petioled.
Leaflet-shape	Obovate to narrowly elliptic or oblong, averaging about 2 times longer than wide, usually not apically emarginate.	Spatulate to obovate, averaging about 1.4 times longer than wide, usually strongly cuneate basally, and apically emarginate.
Leaflet-pubescence	Hairs absent or inconspicuously present on leaflet margin and midrib, short (considerably less than 1 mm. long), subappressed and relatively non-evident.	Hairs very conspicuous on margins and lower midrib of young leaflets, trichomes 1 mm. or more in length, divergent or subappressed, stiff.
STIPULES	3–5 (–6) mm. long, and 1–1.8 mm. wide	Variable in size, mostly 5–8 mm. long and 3–4 mm. wide on main stems, much smaller in inflorescences, sometimes particularly conspicuous at stem tips (previous to flowering) where they sometimes develop before the leaves and overlap in imbricate fashion.
INFLORESCENCE[15]	Flowers arising from leaf axils of nearly entire plant, from main stems as well as branch apices.	Flowers arising from leaf axils of apical shoots; lower nodes frequently give rise to short flower-bearing shoots but not to axillary flowers.
FLOWER[15]		
Calyx	(2–) 2.5–3.3 mm. long; teeth appearing 5 in number, subequal, the dorsal two somewhat united and thus ap-	1.5–1.9 mm. long, teeth appearing 4 in number; 3 (anterior and laterals) similar, narrow, pointed, the

[14] P. L. Ricker (personal correspondence) comments on habit distinctions between these plants as follows: "While the stems of *striata* are often procumbent or decumbent, the tips of the branches almost always turn up and do not lie absolutely flat on the ground as do some stems of *stipulacea*."

[15] Floral distinctions, other than those mentioned here, are abundantly present. These have to do with small but none the less definitive divergences in shape of the petals and the calyx-lobes, as well as the venation of these structures. It is believed that these are more clearly represented in Mr. Gilly's illustrations than would be possible by additional discussion.



Charles Gilly del.

LESPEDEZA STIPULACEA, FIG. 1.
L. STRIATA, FIG. 2.

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Photo John Staby

LESPEDEZA STIPULACEA, FIG. 1.
L. STRIATA, FIG. 2.

Plant-character	L. striata	L. stipulacea
	pearing slightly shorter than others.	other two united almost to the apex, appearing as a single, broad, emarginate tooth.
Petals (non-cleistogamous flowers)	Standard approximating 4 mm. in length, appearing subequal to keel in flower; wings slightly shorter.	Standard about 5 mm. in length, but considerably bowed in flower and appearing conspicuously shorter than keel; keel approximating 6 mm. in length; wings exceeded by both standard and keel.
Fruit (mature)[16]		
Apex	Apically acuminate to a distinct point or beak.	Apically rounded with a very short, straight or recurved point.
Surface	Weakly brownish-black-reticulate, not glandular.	Strongly reticulate with black, cord-like ridges; usually conspicuously glandular.
Adherent calyx	½–⅘ covering fruit.	⅓–½ covering fruit.
Seed (mature)	Black, mottled with lighter areas; distinctly notched or lobed in vicinity of hilum.	Solid purple-black, not mottled; margin nearly entire, scarcely lobed.

Plate 1091

1. Lespedeza stipulacea. 2. Lespedeza striata: *a.* calyx, lateral view, bracts removed; *b.* calyx, upper portion, split and spread open to show shape of lobes and venation (pubescence omitted); *c.* standard,; *d.* wing; *e.* one half of keel. All × 10. Drawings by Charles Gilly.

Plate 1092

1. Lespedeza stipulacea (material from *Isely*, 3848, Colbert Co., Ala.). 2. Lespedeza striata (material from *Isely*, 4420, Henry Co., Tenn., and *Justice and Isely*, 32, Montgomery Co., Ala.): *a.* habit × ½; *b.* stem-enlargement to show pubescence × 9; *c.* leaf and stipule × 1½; *d.* stem-apex, showing pubescence of young leaves × 1½; *e.* mature fruit, calyx present at left, calyx removed at right, both × 4½; *f.* mature seeds × 4½. Photographs by John Staby.

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[16] Excellent descriptions and illustrations of fruit and seed of Common, Kobe, Korean, and Sericea lespedeza are given by F. H. Hillman in a leaflet (no identification or serial number indicated) issued by the Division of Seed Investigations, U. S. Department of Agriculture, December, 1934.

NOTES ON THE COMPOSITAE OF THE NORTHEASTERN UNITED STATES

VI. CICHORIEAE, EUPATORIEAE, AND ASTEREAE

Arthur Cronquist

Aster Priceae Britton has been considered to differ from *Aster pilosus* Willd. in its pink-purple rather than white rays, slightly larger heads, and more restricted, southern distribution. The difference in head-size is not great enough to be depended upon, however, and there is some overlapping even outside the area where the two grow together. Furthermore, occasional otherwise apparently typical forms of *A. pilosus*, growing far outside the range of *A. Priceae*, have pink rays. In Athens, Georgia, I have seen both "species" growing together and apparently hybridizing freely, with many intermediate specimens forming a gradual transition from one extreme to the other. Since the general aspect of *A. Priceae* is similar to that of *A. pilosus*, since the technical differences are inconstant, and since there is field evidence of free hybridization, it seems necessary to reduce *A. Priceae* to intraspecific status.

Aster pilosus Willd. var. **Priceae** (Britton) Cronquist, comb. nov. *A. Priceae* Britton, Man. 960. 1901. *A. kentuckiensis* Britton, loc. cit.

Several years ago Professor Fernald and Mr. Griscom presented a review of the *Eupatorium rotundifolium* group (Rhodora **37:** 179–181. 1935), in which the plants which had generally been treated as *E. rotundifolium* L., *E. pubescens* Muhl., *E. scabridum* Ell., and *E. verbenaefolium* Michx. were considered to represent four varieties of the single species *E. rotundifolium*. Ten years later (Rhodora **47:** 192–193. 1945) Fernald restored these to specific rank, adding a fifth species, *E. cordigerum* Fern. I feel that the earlier treatment is the more nearly correct. In proposing the name *E. rotundifolium* var. *lanceolatum* (Muhl.) Fern. & Griscom, its authors must have overlooked the earlier name *E. verbenaefolium* var. *Saundersii* Porter ex Britton, which applies to the same entity and thus has priority under Article 58 of the International Rules of Botanical Nomenclature. Porter's name was published as a trinomial without designation of rank,

but since it is well known that in 1901 Britton (the publishing author) recognized neither subspecies nor formae it is obvious that the name is of varietal status. A similar condition obtains with regard to trinomials proposed by many of the earlier botanists, who designated their varieties by Greek letters, without definitely stating their rank.

EUPATORIUM ROTUNDIFOLIUM L. var. **Saundersii** (Porter) Cronquist, comb. nov. *E. verbenaefolium Saundersii* Porter ex Britt. Man. Fl. N. States and Can. 923. 1901. *E. lanceolatum* Muhl. ex Willd. Sp. Pl. **3**: 1752. 1804. *E. rotundifolium* var. *lanceolatum* Fern. & Grisc. RHODORA **37**: 181. 1935. *E. verbenaefolium* Am. auth., perhaps not Michx.

It is also clear that Porter intended his name to be of varietal status, since the original label, in his own hand, bears the notation "Eupatorium verbenaefolium Saundersii, var. nov."

Prenanthes racemosa was described by Michaux as having 8–9 involucral bracts and 9–12 flowers in a head. Plants from New Jersey to Quebec, west to Minnesota and Iowa, agree with Michaux's character, although a more ample series of specimens shows that the range of normal variation in number of involucral bracts and flowers is 7–10 (most commonly 8) and 9–16 (most commonly 13), respectively. It will be noted that the numbers most commonly found are both in the Fabinacci series.

More northern and western plants, ranging from Alberta to Colorado, east to Iowa, Minnesota, and thence less commonly to Quebec and northern Maine, have more numerous flowers and involucral bracts. Here again the Fabinacci series is evident, for the principal involucral bracts are 10–14 (most commonly 13), and the flowers are 17–26 in a head (the number centering about 21).

No other correlated morphological differences between these two groups are readily evident, and in the area where both occur they are likely to be collected and distributed under a single number. Plantae Exsiccatae Grayanae 153, for example, from Aroostook River, Maine, includes plants of both types. Although the number of flowers and involucral bracts in a head has long been known to be important in *Prenanthes* (as, indeed, it is quite generally through the family), the differences here seem clearly to be intraspecific. In view of the fundamental morpho-

logical nature of the differences, combined with the well marked segregation in range, I think it proper to consider the two units as subspecies.

Prenanthes racemosa Michx. subsp. **racemosa** Cronquist, nom. nov. *Prenanthes racemosa* Michx. Fl. Bor. Am. **2:** 83. 1803, sens. strict.

Prenanthes racemosa Michx. subsp. **multiflora** Cronquist, subsp. nov. A subsp. racemosa differt involucri bracteis 10–14 (saepius 13), floribus 17–26.

Type: *Macoun & Herriot 43020*, Beaver Hill Lake, Alberta, August 23, 1906. Representative specimens: Wyoming: *Nelson 8923*. Colorado: *Clements 368*. Montana: *Chickering s. n.* in 1874. Saskatchewan: *Bourgeau s. n.* in 1857–8. Manitoba: *Macoun 22799*. South Dakota: *Rydberg 842*. Minnesota: *Holzinger s. n.* at Winona in 1905. Iowa: *Hayden, Strunk & Tolstead s. n.* in 1933. Illinois: *Mead s. n.* in 1846. Michigan: *Williamson 2267*, from Isle Royale. Quebec: *Victorin 15311*.

The great intraspecific variation in the form and degree of cutting of the leaves of the *Cichorieae* in general and *Lactuca* in particular is well known. *Lactuca Serriola* L., *L. canadensis* L., *L. pulchella* (Pursh) DC., and *L. spicata* (Lam.) Hitchc., for example, are among the species now generally conceded to include forms with pinnatifid leaves and forms with the leaves entire or merely toothed. The varying forms of *L. canadensis* appear in the current manuals as distinct species, but were subsequently reduced to varietal status by Wiegand (Rhodora **22:** 9–11. 1920), whose taxonomic conclusions have been adopted by Fernald (Rhodora **40:** 480, 481. 1938) and others.

Contrariwise, it has become customary to distinguish as separate species *L. floridana* (L.) Gaertn., with pinnatifid leaves, and *L. villosa* Jacq., with merely toothed leaves. To bolster this distinction, it has been alleged that the achene of *L. floridana* has a short stout beak, while that of *L. villosa* is beakless. The fact is, however, that the achenes vary from merely tapering and beakless to distinctly short-beaked, with all intermediate conditions and without any evident correlation with leaf-outline.

Torrey and Gray were well aware of this variation in the achene. They described *L. floridana* (under the name *Mulgedium floridanum*) as having the "achaenia with a short beak", while its un-named var. γ differed only in having its "achaenia very obscurely rostrate". *L. villosa* (under the name *Mulgedium*

acuminatum) was said by them to have the "achaenia slightly rostrate". Their further note under *Mulgedium acuminatum*, "Heads small, nearly as the following species; from which the undivided leaves chiefly distinguish it", is quite in accord with my own observations.

More recently, Deam has made the following comment under *L. floridana* in his Flora of Indiana; "Our manuals describe it as having a short, narrow beak. All of my specimens are beakless, at least none with a beak longer than 0.3 mm."

I conclude that the variation from beakless to shortly stout-beaked achenes is without taxonomic significance in this instance.

The use of the epithet *villosa* for the plant with merely toothed leaves might suggest that it is more hairy than *L. floridana*, but the suggestion is not borne out by the specimens. It is worthy of note that when Asa Gray transferred *Sonchus acuminatus* Willd. (1803) to *Lactuca* (Syn. Fl. **1**^{2}**:** 443. 1884), he listed the earlier *L. villosa* Jacq. as a synonym, with the note, "but the plant mostly glabrous or nearly so."

The remaining distinction between *Lactuca floridana* and *L. villosa*, that of the leaves, has been conceded to be not entirely constant, as will be noted by reading the descriptions in the current edition of either Gray's Manual or Britton and Brown's Illustrated Flora. My observations of the leaves are in general agreement with those descriptions. It is possible to refer most of the specimens to one entity or the other by the nature of the leaves, but intermediate specimens exist, and the plants look very much alike in other respects. The range of *L. villosa* is included within that of *L. floridana*, but is apparently less extensive.

The foregoing considerations necessitate the reduction of *Lactuca villosa* to varietal status under *L. floridana*, thus bringing the treatment of these two entities into conformity with that generally used elsewhere in the genus.

LACTUCA FLORIDANA (L.) Gaertn. var. **floridana,** nom. nov. *L. floridana* (L.) Gaertn. Fruct. **2:** 362. 1791, sens strict. *Sonchus floridanus* L. Sp. Pl. 794. 1753.

LACTUCA FLORIDANA (L.) Gaertn. var. **villosa** (Jacq.) Cronquist, comb. nov. *L. villosa* Jacq. Hort. Schoen. **3:** 62, pl. 367. 1798.

Agoseris gracilens (Gray) Kuntze was originally described by Asa Gray (under the name *Troximon gracilens*) as differing from

A. aurantiaca (Hook.) Greene in its narrower leaves and involucral bracts, longer and more slender beak of the achene, and slightly softer pappus. He further noted that *A. gracilens* "resembles slender forms" of *A. aurantiaca*. With the exception of the intangible feature of the pappus, these differences have been largely copied into the current manuals. Unfortunately, there is very little if any correlation between these characters, and the segregation of specimens based on any one of them does not approximate that based on any of the others. Furthermore, the variation in each of them is continuous, with no clear indication of a bimodal curve. Nor have I been able to detect any correlation in range. The variation in size and shape of the leaves is unusual (5–35 cm. long, 1–30 mm. wide, 6–100 or more times as long as wide, rounded to acuminate at the apex), but there are many parallel cases in the tribe, as a survey of some of the species of *Lactuca*, *Sonchus*, *Prenanthes*, or *Taraxacum* will show. I am therefore constrained to reduce *A. gracilens* to *A. aurantiaca*.

Falling, of necessity, with *A. gracilens*, is *A. gaspensis* Fernald. Fernald indicated in his discussion with the original description that the minute technical differences on which he segregated *A. gaspensis* were based on a comparison of the Gaspé plants with the type material of *A. gracilens*. Unfortunately, however, the range of variation of the cordilleran *population* (as distinguished from the type material) encompasses that of the plants from Quebec.

Agoseris aurantiaca, proper, as here defined, ranges from Alta. and B. C. to Calif., northern New Mexico, and probably northern Arizona, and the species is conceded a similar range in the current manuals. Toward the southwestern part of this range, chiefly in Arizona, New Mexico, Utah, and Colorado, but trailing off into Wyoming and southern Montana, occurs a usually recognizable variant which was named *Troximon aurantiacum* var. *purpureum* by Gray. As in *Agoseris aurantiaca* proper, the beak of the achene in this entity varies from barely more than half as long as the body to distinctly longer than the body, and there is a parallel variation in leaf-shape from very narrow and sharply pointed to relatively broad with rounded tip. The proper nomenclatural combination for this southern plant remains to be made.

Agoseris aurantiaca var. **aurantiaca,** var. nov. *Troximon aurantiacum* Hook. Fl. Bor. Am. **1:** 300. pl. 104. 1834. *Agoseris aurantiaca* Greene, Pitt. **2:** 177. 1891. Involucral bracts from not at all purplish to purplish along the midrib and sometimes also finely dotted, rarely conspicuously mottled or blotched, the inner sharply pointed, the outer similar or a little broader and blunter, equaling or a little shorter than the inner. Alberta and British Columbia to California, Utah, northern New Mexico, and probably northern Arizona.

Agoseris aurantiaca var. **purpurea** (Gray) Cronquist, comb. nov. *Troximon aurantiacum* var. *purpureum* Gray, Syn. Fl. **1**[2]: 438. 1884. *Agoseris purpurea* Greene, Pitt. **2:** 177. 1891. Involucral bracts mottled or blotched with purple, conspicuously imbricate, broad, the outer and often also the inner blunt. Arizona, New Mexico, Colorado, Utah, Wyoming, and southern Montana.

When Asa Gray described *Microseris troximoides* in 1874 he named it for its resemblance to *Agoseris* (*Troximon*) *cuspidata* (Pursh) Steud., and noted that "This and *Troximon cuspidatum* indicate a clear transition between the two widely separated genera." The resemblance between the two species, extending to the general appearance, heavy root, crisped, villous-ciliolate leaf-margins, and thin, long-acuminate involucral bracts, is indeed so great that I cannot escape feeling that they are closely related. The only reliable feature to separate them is the pappus, which consists of 10–25 slender, gradually attenuate paleae in *M. troximoides*, and about 40–80 mixed capillary bristles and even more slenderly attenuate paleae in *Agoseris cuspidata.*

With the keen sense of relationships that his extreme splitting of genera and species has led many of us to forget, Edward Lee Greene united the two species concerned, with another which he described (probably a synonym of *M. troximoides*), into a new genus *Nothocalais* (Bull. Cal. Acad. **2:** 54, 55. 1886). *Nothocalais* was merely one of the several groups which Greene's liberal generic views led him to segregate from *Microseris.* Later, Henderson described another valid species, *Microseris nigrescens,* as being "Certainly closely related to *M. troximoides,*" but differing among other things "in the very fine pappus, not half so wide as in that species," and being therefore "A nearer approach still to *Troximon*" (Bull. Torrey Club **27:** 348, 349. 1900).

The affinity between these three species, *Microseris troxi-*

moides, *M. nigrescens*, and *Agoseris cuspidata*, is so plain and so great that any treatment which leaves them in separate genera is unnatural. *Microseris troximoides* and *M. cuspidata* fit well into that genus, if it is defined in the broad sense of Asa Gray rather than in the narrower sense of Greene and Rydberg. *Agoseris cuspidata*, on the other hand, is intermediate between *Agoseris* and *Microseris* in its pappus, and is further anomalous in *Agoseris* because of its beakless achenes. Its nearest relative in *Agoseris* would appear to be the short-beaked *A. glauca* (Nutt.) D. Dietr., but the affinity does not seem particularly great. The achenes of *Microseris* are regularly beakless. It may also be noted at this point that *Microseris Forsteri* Hook., the only species of the genus found in Australia and New Zealand, has the pappus-bristles only slightly dilated at the base, scarcely more so than in *Agoseris cuspidata*.

It seems plain that on both morphologic and phyletic grounds *Agoseris cuspidata* should be transferred to *Microseris*. The proper combination was made many years ago by Schultz Bipontinus (Pollichia **22–24:** 309. 1866). The plant Schultz had in mind was actually *Microseris troximoides*, which was not "discovered" and formally named until 1874, but, nomenclaturally, *M. cuspidata* was strictly a transfer of *Troximon cuspidatum*.

There remains only one species of *Agoseris* with beakless achenes. This is *A. alpestris* (Gray) Greene, which Greene transferred without comment, along with a number of others, when he displaced *Troximon* with *Agoseris*. Its pappus is of capillary bristles, although these are seen to be compressed near the base. Its affinity with *Microseris* § *Nothocalais* is not so plain as that of "*Agoseris*" *cuspidata*, but some specimens show the peculiarly villous-ciliolate leaf-margins, and many of the specimens have one or two reduced cauline leaves well separated from the basal cluster. This latter character is wholly consonant with *Microseris*, but quite foreign to *Agoseris*. The involucre would not be out of place in *Agoseris*, but is distinctly suggestive of *Nothocalais*.

I would be inclined to transfer *Agoseris alpestris* to *Microseris*, thus leaving the development of a beak on the achene of *Agoseris* as a handy technical character to distinguish that genus from *Microseris*, were it not that Dr. Stebbins informs me that in California *A. alpestris* enters into a polyploid-apomictic complex

with *Agoseris glauca*. Here, as elsewhere in the *Compositae*, the genera are not sharply distinct, and species which on their morphology alone are not clearly referable to one or another of a pair of allied genera, must be placed according to their apparent relationship.

Microseris and *Agoseris* may now be redefined as follows:

AGOSERIS: Scapose, or sometimes very shortly caulescent in the annual species, the scape strictly naked above the cluster of leaves at the base (or with one or two reduced upper leaves in *A. alpestris*); involucral bracts subequal or imbricate; achenes evidently beaked at maturity, the beak short and stout or long and slender (beakless in *A. alpestris*); pappus of numerous capillary bristles.

MICROSERIS: Scapose or more or less leafy-stemmed; involucral bracts subequal, imbricate, or calyculate; achenes columnar to fusiform, but scarcely beaked; pappus of 5– many members, these with paleaceous base and slender, bristle-like, naked or plumose tip (intermingled with capillary bristles in *M. cuspidata*).

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A. PROSTRATE RORIPPA.—

RORIPPA ISLANDICA (Oeder) Borbas, var. MICROCARPA (Regel) Fernald, forma **reptabunda,** forma nov., caulibus elongatis repentibus 2–12 dm. longis; foliis plerumque simplicibus. Coös County, NEW HAMPSHIRE: muddy shore of Nash Stream Bog, Odell, 27 August, 1947, *A. S. Pease*, no. 33,162 (TYPE in Herb. Gray.; ISOTYPE in Herb. New Engl. Bot. Cl.); exsiccated shore of First Lake, Pittsburg, 3 September, 1947, *Pease*, no. 33,186.

This striking form, with very long, prostrate 1-sided stems rooting at the nodes and up to 1.2 m. long, its very numerous axillary fascicles with mostly simple leaves, abounds, Dr. Pease tells me, on the exsiccated margins of the two ponds. It is, perhaps, an ecological form, the stems starting growth in shallow water and on drying-out of the ponds, unable to maintain the usual upright habit. On the other hand, plenty of colonies of the species keep the ascending habit under similar conditions.—M. L. FERNALD.

FRUIT KEY TO NORTHEASTERN TREES
(A Reply to a Review by M. L. Fernald)

Wm. M. Harlow

The editor of "Rhodora" kindly reviewed the above publication in the March 1947 number of that periodical. It is the intention of this reply to discuss facts and not to descend to the plane of half-truths and innuendoes.

Perhaps it should be stated that the key was written for beginning students in biology, and not for taxonomists. This is apparent to anyone who reads it, and was so indicated in the preface.

Evidently the reviewer does not like fruit keys as such. For many years foresters, seedsmen, horticulturists, and others have struggled with keys which use, indiscriminately, leaf, flower, and fruit characters. Suppose someone sends you a fruit sample with no branches or leaves, to say nothing of flowers. Just how do you key it in such manuals as "Gray's New Manual of Botany," 7th Ed.? The author, therefore, offers no apology for having attempted to produce a workable key using only fruit characters.

Should a key slavishly follow some system of natural classification and thereby indicate the relationships of the plants included, or should it be a device for quickly and easily determining the identity of an unknown specimen? The reviewer seems to favor the first alternative, the author the second. However, when the reviewer says that *Liriodendron* is keyed out with *Abies*, he is stating only half of the truth, since anyone happening to run out *Liriodendron* at this point is referered to No. 37 in the key where this genus is included and *illustrated* in its "proper" place among the Angiosperms bearing samaras. The inclusion of *Liriodendron* with *Abies* is only for the neophyte who might pick up a green or newly ripe "cone" of the tuliptree and not sense that it is composed of samaras which soon become detached.

When it comes to the reviewer's suggested separation of *Tsuga* and *Picea*, the force of the saying "that only the dead are consistent" really becomes apparent: N. B. at this juncture the reviewer would have used an exclamation point (!). He states that *Tsuga* has "scattered" leaves, but that in *Picea* they are

"spirally arranged" (the temptation to use an exclamation point is almost irresistible). To check this separation of these genera, the author consulted three authorities; (1) "Gray's New Manual of Botany," 7th Ed., (2) "Manual of Cultivated Trees and Shrubs" by A. Rehder, and (3) Nature, but not necessarily in the order given. Almost unavoidably, some rather astonishing discrepancies between (1) and (2 and 3) were discovered. Gray's Manual states that the leaves of not only *Tsuga* but also *Picea* and *Abies* are "scattered," which may be presumed to mean that they have no arrangement but are borne helter-skelter on the twig. No. 2 agrees with No. 3 that they are all spirally arranged.

The generic key under Pinaceae in Gray's Manual has an error in the leaf arrangement of *Larix* as follows:

*Leaves in bundles of two or more

1. Pinus. Leaves 2–5 in each bundle, evergreen.
2. Larix. Leaves many in each cluster, deciduous.

Furthermore, under the generic description of *Larix* the statement is made, "leaves . . . very many in a fascicle, developed in early spring from lateral scaly and globular buds." By contrast, Rehder's statement is wholly descriptive of what one actually finds in nature viz: "leaves spirally arranged and remote on the long shoots, densely clustered on the lateral short spurs." Since the leaves on new growth are single and spirally arranged, it may be presumed that this is also their arrangement on the spurs. The appearance of "whorls" or "clusters" is due to the extremely slow growth in length of these dwarfed branches. To refer to larch leaves as "fascicled" or in "bundles" as are those of the pines, promotes error and confusion.

About the only actual errors the reviewer could find (there were some he failed to see) were those of indiscriminate use of upper and lower case in common names. The author is glad to have these called to his attention and has already corrected them in the new printing of the key. Even here, however, the reviewer was careless in quoting "Chinese-sumac." The hyphen was necessary because "Chinese-" came at the end of a line and "sumac" began the next line. "Chinesesumac" was indicated, not "Chinese-sumac."

If they like, the authors of "Standardized Plant Names" may reply to the comments on "that presumptuous model." Its saving grace is that when a student sees the names osageorange, tanoak, and pineapple, he knows that the first is not an orange, the second is not an oak, and the third is not an apple. By the way, does the reviewer spell pineapple "pine" "apple" and if not, why not?

Evidently the author's primary error was in sending a copy of the key to "Rhodora" for review. It was his misconception that the magazine was actually "devoted primarily to the flora of the Gray's Manual Range and regions floristically related." In his opinion, a key based upon fruit characters fell within these limits.

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GENERIC STATUS OF TRIODANIS AND SPECULARIA

Rogers McVaugh

In Rhodora for September, 1946, Professor M. L. Fernald discussed in detail the case of "*Triodanis* versus *Specularia*"[1], concluding that as a genus *Triodanis* "seems . . . very weak." He advocated the reunion of *Triodanis* with the European genus *Specularia*, in accordance with the policy established by Alphonse DeCandolle in 1830 and subsequently followed by practically all European workers and most Americans. Professor Fernald's conclusions were reached after examination of my earlier paper on *Triodanis*[2], and his objections to the maintenance of the group as an independent genus were based chiefly upon what he called the "reputed generic differences" which he understood to be summarized in two paragraphs of this earlier paper. He felt that these "differences" did not include constant strong morphological characters, and he considered that some of them had been over-stressed or were, indeed, meaningless as set forth. He showed to his own satisfaction that *Triodanis* was not to be considered "a clearly distinct genus" (that is, distinct from *Specu-*

[1] Rhodora 48: 209–214, 215, 216. pl. 1049, 1050.
[2] Wrightia 1: 13–52 1945.

laria), but apparently he did not consider what I believe to be the main issue, the existence of either *Specularia* or *Triodanis* as a real entity apart from *Campanula*.

The case for *Triodanis* has already been set forth at length, in the paper referred to above, but I think it worthwhile to reopen the discussion here in the pages of RHODORA, because of my own conviction that *Triodanis* constitutes a biologically coherent group of species which is as well founded as most genera of the *Campanulaceae* and which should be recognized as an independent genus. One infers from Professor Fernald's article that *Specularia* will be used in the traditional, inclusive sense, in the forthcoming 8th edition of "Gray's Manual," and it would seem unfortunate to have this generic name perpetuated indefinitely, through the undoubtedly enormous influence of the "Manual," without some further examination of the qualifications of the genus.

In the first place it may be reiterated that there is no justification whatever for maintaining *Specularia*, in its traditional circumscription, as a genus apart from *Campanula*. It is neither sharply delimited nor homogeneous, and its components are evidently less closely akin to one another than to *Campanula* itself. If the inclusive *Specularia* be dismembered, however, as suggested previously[1], and restricted to the type-species and one other, it may be maintained as a weak segregate from *Campanula*. To quote my own words (*Wrightia*, l. c.): "The desirability of recognizing *Specularia* as a genus is still [after dismemberment] open to question, but the combination of divided corolla, elongated capsule and glabrous filaments is unique among the annual species of the *Campanula* complex, and these similarities may indicate some generic affinity between the two entities involved [i. e. the two original species of *Specularia*, *S. Speculum-Veneris* and *S. hybrida*], although these [species] are superficially dissimilar in aspect, degree of branching, and size and shape of flowers".

The weakness of *Specularia* as a genus was recognized by Alphonse DeCandolle, whose *Monographie des Campanulées* (1830) has been the foundation for all subsequent work on the *Campanulaceae*. Of the species of *Specularia* DeCandolle wrote (*Monographie*, p. 46, here translated from the original French):

[1] Wrightia 1: 17. 1945.

"They form a group very near the Campanulas, and distinct more by the habit than by any positive characters". He went on to explain that in spite of analogies between species of *Specularia* and similar species in *Campanula*, he had experienced no difficulty in distinguishing the two genera "except for the one species *C. fastigiata* Duf., which is so intermediate, in habit and other characters, that one can at will place it in the one genus or the other". One certainly cannot quote DeCandolle in support of insistence upon strong morphological characters as generic criteria in the *Campanulaceae!*

It is worthwhile here to examine in some detail the philosophical concepts employed by DeCandolle in delimiting the genera of *Campanulaceae*, since his *Monographie* remains the latest significant or original work on the family as a whole. The compilations of Endlicher, Bentham & Hooker, and Schönland, as far as these relate to the *Campanulaceae*, are taken over from DeCandolle's work without any important changes. Endlicher's *Genera* (1838) followed the *Monographie* even as to the sequence of genera, and without any change in generic concept. Bentham & Hooker (*Genera*, vol. 2, part 2, 1876) accepted DeCandolle's genera as delimited by him, except that they submerged the monotypic *Petromarula* in *Phyteuma*, explaining its earlier separation on the basis of mistaken observation on the part of DeCandolle. Schönland likewise (in Engler & Prantl, Natürl. Pflanzenf. **4:** part 5, 1894), used DeCandolle's genera essentially unchanged; like Bentham & Hooker he added certain genera discovered since 1830, and like them he submerged *Petromarula*.

In writing on the delimitation of genera DeCandolle was emphatic that he did not set up these groups merely because they could be separated from related groups by arbitrary characters; to him a genus was a natural unit, recognizable by its own combination [*"ensemble"*] of features. The coherent anthers of *Symphyandra* were not enough in themselves to establish the group as a genus; he pointed out (*Monographie*, p. 47) that it was "besides natural enough as to habit and other characters". He summed up his practice in the following words (p. 64): "I have not kept or established any genus which was not founded at the same time on positive characters and on the habit [*le port*], or, in other words, on the reproductive organs and those of vegetation".

In the case of *Specularia*, as he said himself, the genus depended more upon the habit than upon the positive characters! Nor is this the only case in point: of *Platycodon* and *Microcodon* he wrote that these were not separated by any strong characters (p. 63), but "unhappily, their habit is so different that one is forced thereby to make two distinct genera". Yet *Specularia*, *Platycodon* and *Microcodon*, founded as they were without any strong morphological basis, but recognizable chiefly by their *ensembles* of characters, were accepted without question by Endlicher, Bentham & Hooker, and Schönland.

DeCandolle was fully aware that the genera of *Campanulaceae* are interrelated in a reticulate pattern (*Monographie*, p. 64). He pointed out that the ill-defined genus *Campanula* constitutes a sort of center in the group to which it belongs: "[It] has around it the genera *Specularia*, *Adenophora*, *Symphyandra* and *Michauxia*, which are very close to it [*qui en sont très rapprochés*], and which touch at each of its subdivisions . . . All are closer [*plus voisins*] to the genus *Campanula* than to one another. Thus whatever linear series be adopted, it will necessarily be imperfect on this point." I am in full agreement with the thought expressed in this quotation, and to the genera enumerated by DeCandolle I should add *Triodanis;* whether it be considered an independent genus or not, it seems no more closely related to *Specularia* (in the restricted sense) than to other annual species of *Campanula*. This was discussed in *Wrightia* (l. c.), and some of the following discussion bears on the same question.

The above remarks should be enough to make clear my first point, which has to do with the manner of delimitation of genera in the *Campanulaceae*. The genera in this family stand independently only when their coherence makes them biological units, recognizable to us by some combinations of characters which do not appear elsewhere in the family. There are a few genera like *Adenophora* and *Downingia* which are possessed, in addition, of distinctive morphological characters, sufficient without any additional evidence to set these genera apart. There are also some 30 monotypic genera which are unique or not according to the opinions of individual systematists, and which are founded for the most part upon single characters of doubtful or minor import. In the great majority of cases, however, the most important thing

about each genus, from the standpoint of classification, is its own existence as an entity, not some arbitrary and possibly quite meaningless difference between it and some other group. The genera of *Campanulaceae*, much as we should like them to constitute natural biological groups, are still more or less artificial, delimited partly for the sake of convenience (we do not know, for example, that the coherent anthers of *Symphyandra* have any particular phylogenetic significance, but it is convenient and apparently natural to assemble under this name all the species having this character), and nothing can improve our system of classification more than full realization of this. If we are to depend upon what may be called the method of delimitation of genera by separation, by splitting blocks off the corners of some larger mass, by arbitrary quantitative differences which are easily measured and applied to limited numbers of specimens, then we shall lose sight of the biological implications of classification. In contrast it is possible usually to delimit genera most satisfactorily as it were by accretion, by building around natural centers of population as determined by studies of morphology or by the use of whatever techniques may be available. With emphasis placed upon similarities and affinities, rather than upon differences, it should be possible for systematists to arrive at schemes of classification more generally acceptable to their colleagues and to the general public.

The above applies specifically to the *Campanulaceae* (including the *Lobelioideae*), but I judge that it is equally applicable to most other plant-families, or perhaps to all of them. *Fragaria*, for example, is none too solidly founded on morphological grounds; it is, in fact, about as distinct from *Potentilla* as *Triodanis* from *Campanula*. But what could constitute a better genus than *Fragaria*, homogeneous as it is, and comprising several species all exhibiting the same combinations of traits? Examples of similar cases in other plant-families could be multiplied, but note merely how it applies to *Triodanis;* again the following quotation is from *Wrightia:* "The combination of annual habit, deeply divided corolla, capsule longer than wide and opening near the apex, spicate inflorescence, and regular production of cleistogamous flowers at the lower nodes is a unique one, and when found in a relatively large number of species surely points to a genetic dis-

continuity that may be called a generic distinction". The characters of *Triodanis* individually are not particularly strong; each of them (with the possible exception of the pattern and rhythm of the cleistogamy) has its counterpart or near-counterpart in *Campanula*. There is thus no sharp break between *Triodanis* and *Campanula*, but neither is there a sharp break between *Aster* and *Erigeron*[1]; there IS such a hiatus between *Triodanis* and *Specularia*, but none between the latter and *Campanula*. Neither *Specularia* nor *Triodanis* can be maintained as genera distinct from *Campanula* except through primary emphasis on the stature given them by their collective features, but if one wishes he can distinguish technically between the two as follows, understanding that the differentiating characters are quite possibly minor ones which CONFIRM rather than AFFIRM the generic distinction emphasized by the *ensemble:*

TRIODANIS: Filaments ciliate at base; central flowering axis and those of the main branches spicate; flowers at the lower fertile nodes prevailingly cleistogamous.

SPECULARIA: Filaments glabrous; plants normally diffusely branched, the flowers clustered near the tips of the branches or corymbosely aggregated at the summit of the plant; flowers all corolliferous.

With the above in mind, we may consider some of the morphological characters which together define *Triodanis* and *Specularia*, in the light of Professor Fernald's remarks. Before any detailed consideration I must make public apology for careless presentation in my earlier paper. On pages 13 to 20 of the first volume of *Wrightia* were set forth what I took to be sufficient technical data and philosophical considerations to justify the acceptance of *Triodanis* as a genus. To these were added, on pages 20 and 21, synopses to facilitate comparison of the features of *Campanula, Heterocodon, Specularia,* and *Triodanis*. These synopses emphasized not only differences between the genera but also qualifying and parallel conditions. They were not intended, as Professor Fernald seems to have assumed, to stress individual diagnostic characters; nor were they for use as a key to genera, as their perhaps unfortunate position at the beginning of the section entitled "Systematic Treatment" may have indicated. My own position in the matter was clearly stated, although evi-

[1] See Cronquist's remarks on this, in Brittonia 6: 122–123. 1947.

dently not sufficiently emphasized, on page 20: "It will be noted [i. e. in the following synopses] that the generic characters of the groups segregated from *Campanula* are all weak ones, in no case involving strong morphological features which absolutely separate them from the more inclusive genus, but always depending upon combinations of weaker characters which reappear individually in unrelated species of *Campanula*".

I must make further apology for not describing more precisely what Professor Fernald implies is a sort of neo-Rafinesquian distinction. This is the matter of the quite different types of branching exhibited by species of *Triodanis* and *Specularia*, respectively. In contrasting these two groups, I carelessly omitted mention of the rather obvious fact that both branch freely from the very base or near it, when the plants are growing under favorable conditions. As Professor Fernald infers, this type of branching is to be expected in annual weedy plants, and is of no importance as a taxonomic character in this case. Quite different, however, is the branching of the central flowering axis, which is spicate in *Triodanis* and corymbosely branched in *Specularia*. It is true that the growth of lateral branches in *Triodanis coloradoensis* may obscure the "racemose" condition of the axis, but this last may still be discerned on most of the branches in specimens except vigorous old fruiting plants; even in these, as in Professor Fernald's plate designed to show the opposite condition (plate 1050), the "racemose" tendency is evident on the lower branches. It is of course to be remembered that truly racemose branching does not occur in the *Campanulaceae* proper, the spike of *Triodanis* being apparently a derived inflorescence-type which is fundamentally determinate, and in which the single-flowered nodes are so because of abortion of potentially active branch-buds below the terminal ones, each solitary axillary flower representing an axillary branch reduced to this extent. Under conditions favorable for growth these branches may elongate and produce several flowers, or branch again, excessive stimulation occasionally causing the development of plants suggesting some really different species[1]. The branching of *Triodanis*, as discussed in *Wrightia* (l. c. 23–24), follows a definite pattern but evidently

[1] As in *Campanula americana*, a species with a spicate inflorescence very similar to that of *Triodanis;* see Bartonia **23**; 37–39. 1945.

is not fundamentally different from that of other campanulaceous genera. It serves none the less as an important diagnostic character if it be remembered that it may be influenced by environment, although primarily under genetic control.

The branching in *Specularia* (as the genus was restricted in *Wrightia*, is essentially like that in many other annual campanulaceous plants. Branches from the upper axils are the rule rather than the exception, so that the flowers are usually in small groups or solitary at the tips of slender branches, the whole forming a diffuse or clustered but definitely branched inflorescence, and the terminal flower often being exceeded by the growth of the lateral branches and more or less immersed in the inflorescence. The "racemose" condition is approached, as it may be in most annual and many perennial species of *Campanula*, in imperfectly developed plants. Through the kindness of Dr. Charles Baehni, I have seen the Gittard specimen cited by Boissier (Fl. Orient. **3:** 959. 1875) as the type of *Specularia Speculum*, var. *racemosa*, to which Professor Fernald refers. The plant is not a stunted or starved specimen, as I had speculated, but one in which the usual lateral branches from the upper part of the main axis are all equally very short (3–5 mm. long) and tipped each with a cluster of 3 or 4 flowers. The resulting inflorescence is "racemose" about to the same extent as that of *Solidago Virga-aurea;* it is long and slender, with numerous short flowering branches. It is by no means "ut in *Sp. falcatâ* racemosa" as Boissier said, unless one wishes to stress (it seems to me unduly) the homology between the normally reduced, one-flowered branches of the "raceme" of *Sp. falcata*, and the abnormally reduced, several-flowered branches of this one specinem of *Sp. Speculum-Veneris*. I take it that the strength or weakness of any genus lies in what its species usually or regularly have in common, not in abnormal plants which may vary markedly in one character or another from their closest relatives. Such aberrant individuals may offer valuable clues in regard to past evolutionary connections between species or genera, or in regard to evolutionary tendencies, but hardly suffice in themselves to determine generic limits in present-day populations.

Professor Fernald argues that the mere existence of cleistogamy

in *Triodanis* is not enough in itself to justify the separation of *Triodanis* and *Specularia*. He cites several genera in different plant-families, suggesting that in *Utricularia*, *Panicum*, *Viola*, and *Danthonia* the mere occurrence of this trait in certain species does not justify the generic segregation of these species from the more inclusive groups. He is of course amply justified in this view, but strict analogy and adherence to his expressed views would then suggest the union of *Triodanis* not with *Specularia* but with *Campanula*, where cleistogamy does occur in some species (as far as I am aware, no one has suggested that these should be separated off as a distinct genus because of this one trait!). It is of course not the mere occurrence of cleistogamy but the unique pattern of its development in *Triodanis*, when correlated with other characters, that is noteworthy. Many individual plants of *Triodanis coloradoensis*, for example, produce all corolliferous flowers, but the many others that show cleistogamy follow the development-pattern of the other species of the genus, indicating their biological affinity to these rather than to *Specularia*, in which the approach to the cleistogamous condition appears to be analogous, rather than homologous, to that in *Triodanis*.

In the past the principal supposed distinction between *Specularia* and *Campanula* has been in the capsule, that of the former genus often having been referred to as cylindric, or oblong, or perhaps most often as linear (the latter by Boissier, l. c. 958, by Bentham & Hooker, l. c. 562, and by McVaugh, l. c. 21). Professor Fernald truly points out that there is great variation in the capsules of these species; actually one can find in almost any species of *Specularia* or *Triodanis* individual plants which have the supposed (relatively) broader capsules of *Campanula*, or the narrower ones of the segregate genera. One can not with reason remove either genus from *Campanula* (or separate them from each other) on the basis of capsule-shape. The character is of little use except in descriptive matter, and I regret that my earlier paper did not make this clear even to the superficial reader.

It is worth noting, since the recognition or non-recognition of a given genus depends so largely upon tradition and the weight of authority, that in maintaining *Triodanis* one does not necessarily label himself a disciple of the eccentric Rafinesque. The recog-

nition of the American "Specularias," as a group distinct from the European ones, seems to have begun with DeCandolle (*Monographie*, p. 47, 351), who felt that the one American species recognized by him constituted a "distinct section" (to which he gave no name). It may be argued, if one cares to resort to a syllogism, that this section occupied a place in DeCandolle's scheme of classification approximately equivalent to those occupied by sections in other genera (e. g. Sect. *Edraiantha* of *Wahlenbergia*, and Sect. III of *Phyteuma*)—sections that were soon recognized as independent genera. The astute Boissier, for example, maintained *Edraianthus* as a genus in the *Flora Orientalis*, and took up George Don's name *Podanthum* for what DeCandolle had regarded as a section of *Phyteuma*. Both *Edraianthus* and *Podanthum* (i. e. *Asyneuma* according to current rules of nomenclature) are now widely accepted as good genera. Whether or not this strengthens the case for the recognition of *Triodanis*, the fact remains that the group received a formal designation in Endlicher's *Genera* in 1838 (*Specularia*, sect. *Dysmicodon*). Thomas Nuttall, who knew the American flora well and was by no means without judgment, soon elevated this section to generic rank as his genus *Dysmicodon*[1]. In support of this view he said: "Nearly allied to *Specularia*, but with a different habit, calyx and seed; and with the lower flowers apetalous and reduced in the number of their parts". In the same paper Nuttall went so far as to propose a second segregate (as he thought from *Specularia*), comprising one species, *Campylocera leptocarpa*. This genus he supposed to be founded chiefly upon the unilocular, laterally dehiscent capsules of most of the imperfect flowers. As has previously been explained in *Wrightia* (pp. 50–51), Rafinesque seems to have "stolen" the idea for his species *Triodanis scabra* from Nuttall's annotated specimen, and it is entirely possible that the idea of the genus itself was not original with Rafinesque.

Nuttall's genera *Dysmicodon* and *Campylocera* were taken up by John Torrey, who was anything but eccentric and who apparently espoused Nuttall's proposals with full realization of what he was doing, for he had used the name *Specularia* in his earlier publications and formally designated the American species as a

[1] Trans. Am. Phil. Soc. n.s. 8: 255. 1843.

distinct group, sect. *Triodallus*.[1] Torrey seems to have been using *Campylocera* as late as 1870, if one may judge by his annotation on Palmer's no. 168, *Triodanis Holzingeri*, now in the U. S. National Herbarium.

More widespread recognition and use of the names *Dysmicodon* and *Campylocera* was doubtless prevented by the influence of Asa Gray, who published a footnote-monograph on "*Specularia*" in 1876[2]; *Campylocera* was used by C. C. Parry in a paper published in 1872[3], but so far as I am aware no one publicly questioned the integrity of the inclusive *Specularia* from that time until the days of E. L. Greene.

I should like to close this paper with an illustration from another group of the *Campanulaceae*, the subfamily *Lobelioideae*, in order to emphasize once more the fact that campanulaceous genera (and most other genera, as far as my observations go) in the great majority are founded not solidly upon strong morphological separations, but solidly upon what appear to be natural combinations of characters, in the tradition of Alphonse DeCandolle.

Recent opinions estimate the number of genera of *Lobelioideae* in North and South America together at about 12 to 15 (excluding *Cyphioideae*)[4]. From all the others *Lysipomia* and *Downingia* stand clearly apart as independent genera differentiated by strong morphological characters. *Howellia* is a monotypic, aquatic genus of restricted distribution, distinct because of its seeds which are several times larger than in any other known genus of the family. All the remaining lobeliaceous genera (12 according to one estimate) can be referred to *Lobelia* (those with capsular fruits) or to *Centropogon* (those with baccate fruits) without significant additions to the morphological features of these genera as currently understood! These minor genera may be founded upon a single character (e. g. *Heterotoma*) or upon an assemblage of weak characters (e. g. *Diastatea*); some are doubtless real entities deserving of recognition, others are so weak that hardly more than tradition keeps them alive, but even these border-line

[1] Fl. N. Y. **1**: 428. 1843. For use of *Dysmicodon* and *Campylocera* see Rep. Pac. R. R. Surv. **4**: 116. 1857, and Rep. Mex. Bound. Surv. 108. 1859.

[2] Proc. Am. Acad. **11**: 81–83.

[3] Rep. Hayden Surv. 1870 [4th Ann. Rep. U. S. Geol. Sur. Terr.]: 486.

[4] North Am. Flora **32A**[1]: 1–134. 5Ja 1943; Das Pflanzenreich **IV.** 276b (**heft 106**): 37–40. 25My 1943.

genera can hardly be merged with their supposed relatives until we know more about what a genus really is, and how it is constituted. *Triodanis*, in my opinion, is as well founded as the average genus in its family, and should be maintained unless we are to have a very severe general reduction in the number of genera recognized in the *Campanulaceae*.

University Herbarium, University of Michigan,
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A NOVA SCOTIAN DWARF SHADBUSH

M. L. Fernald

Amelanchier **lucida** (Fernald), stat. nov. *A. stolonifera* Wiegand, var. *lucida* Fernald in Rhodora, xxiii. 267 (1921).

When this shrub of sandy or peaty barrens and gravels of Nova Scotia was described I placed it with *A. stolonifera* Wiegand, not then fully understanding how constant (except in hybrids) is the presence of dense tomentum on the summit of the ovary, this character practically invariable in the following stoloniferous or surculose species in eastern North America: *A. alnifolia* Nutt., *A. humilis* Wiegand, *A. mucronata* Nielsen, *A. gaspensis* (Wiegand) Fernald & Weatherby, *A. stolonifera* Wiegand and *A. Fernaldii* Wiegand. When the lustrous-leaved shrub of Nova Scotia was discovered by Long and me I wrote:

> one of the neatest little shad bushes we ever saw, a beautiful shrub with stoloniferous habit, low stature (3–6 dm.) and nearly orbicular dark-green, highly lustrous leaves. Afterward, at Grand Lake, Halifax County, at Springhill Junction in Colchester County, at Middleton in Annapolis County and at various places westward we found it a thoroughly distinct and dominant shrub of barrens, either dry or wet. In habit it resembles *A. stolonifera* Wiegand,[1] a characteristic shrub from Maine to Virginia and in eastern Newfoundland, with dull and pale-green or glaucous foliage and with the summit of the ovary densely tomentose; but this characteristic Nova Scotian shrub with dark, glossy leaves has the summit of the ovary wholly glabrous, though it is sometimes arachnoid or sparsely pubescent. Typical *A. stolonifera* we found in Nova Scotia, though only once; but the common shrub is so well marked that it should be separated as a variety.—Fernald, l. c. 130 (1921).

The dark green and lustrous coriaceous leaves are so unlike those of *Amelanchier stolonifera* that the shrub can not properly

[1] Wiegand in Rhodora, xiv. 144 (1912).

be treated as belonging to that species, and the glabrous summit of the ovary is all wrong. Furthermore, the terminal overwintering buds of *A. stolonifera* are reddish-brown and only 6 or 7 mm. long. We have no fully developed terminal buds of *A. lucida*, but a vigorous shoot, collected on September 8, shows a slenderly lance-acuminate yellowish bud essentially 1 cm. long. Autumnal material, most kindly secured for me at the type-locality by Professor Horace G. Perry, has the new leaves already pushing out after a very warm September. So far as the bud-scales show they are like those just noted. Neither do we know the flowers of *A. lucida*, but the fruit, of which we have an abundance, is scarcely that of *A. stolonifera*. In the latter the mature pedicels are pubescent, the mature hypanthium 3–4 mm. in diameter, the mature sepals recurved. In *A. lucida* the pedicels are glabrous, the mature hypanthium 5–7 mm. in diameter, the sepals erect.

Only two low and strongly stoloniferous species of the genus are recognized in eastern North America, in which the summit of the ovary is glabrous. One is the characteristic little *Amelanchier obovalis* (Michx.) Ashe, which was discussed and illustrated in Rhodora, xliii. 566, pl. 672, fig. 3 (1941), a colonial species of pinelands from Georgia and Alabama north to eastern Maryland, southeastern Pennsylvania and southern New Jersey (and at the eastern edge of the Alleghenies in Virginia). Here is the real relationship of *A. lucida*. From *A. obovalis* the latter differs in the pale (instead of reddish-brown) terminal overwintering buds; its coriaceous, dark green and lustrous (instead of membranaceous, pale green and opaque) leaves; its fruiting raceme with glabrous (instead of pubescent) rachis and pedicels; the longer pedicels 1–2.5 cm. (instead of 3–12 mm.) long; hypanthium 5–7 (instead of 2–3) mm. in diameter; the fruit obviously longer.

The other species, found on a remnant of the Atlantic Coastal Plain midway between the northern limit of *Amelanchier obovalis* and the Nova Scotian area of *A. lucida*, is the endemic *A. nantucketensis* Bicknell in Bull. Torr. Bot. Cl. xxxviii. 453 (1911), a species which in its morphological characters is midway between *A. obovalis* and *A. lucida*. In outline and texture of mature leaves and diameter of hypanthium it is similar to *A. obovalis* but the expanding leaves are glabrous or promptly

glabrate (instead of heavily white-tomentose) beneath; the mature leaves sublustrous above (instead of dull); racemes lax and 2–4.5 cm. long, with glabrous or promptly glabrate rachis and pedicels, the longer pedicels 1–2 cm. long (in *A. obovalis* the rather dense racemes 1–3 cm. long, the flowering pedicels white-tomentose, the fruiting ones pilose, the longer ones 3–12 mm. long); sepals 2–4 mm. long, soon recurving (in *A. obovalis* 1–2 mm. long, erect or tardily spreading); petals linear-oblanceolate, frequently involute (in *A. obovalis* narrowly elliptical and flat).

From *Amelanchier nantucketensis* the Nova Scotian *A. lucida* differs in its coriaceous and highly lustrous oblong, broadly elliptic or subrotund (instead of membranaceous and less lustrous elliptic-oblong to oblong-obovate) leaves 1.5–6.5 cm. long and 1–4 cm. broad (instead of only 2–3 cm. long and 1.5–2 cm. broad); sepals remaining erect (instead of recurving); hypanthium 5–7 mm. (instead of 4–5 mm.) in diameter.

Although in his monograph of *Amelanchier* Dr. G. N. Jones treated *A. nantucketensis* as the nonstoloniferous fastigiate tall shrub or tree, *A. canadensis*, and *A. lucida* as one of the many shrubs under the inclusive *A. spicata* sensu G. N. Jones, not K. Koch, the glabrous summit of the ovary clearly shows that *A. lucida* does not belong in that miscellaneous complex with the summit of the ovary tomentose. The permanently attached identification-labels on the Gray Herbarium sheets of the dwarf and stoloniferous *A. obovalis*, with the identifications marked as *A. canadensis*, indicate that in case of *A. obovalis*, maintained in his publication by Dr. Jones, there must have been an error in so misidentifying a large number of sheets.

As here interpreted, the three dwarf and stoloniferous colonial species with glabrous summits of ovaries make up a series of chiefly Coastal Plain dispersal: *A. obovalis* following the Coastal Plain (but rarely found inland) from Alabama and Georgia to eastern Maryland, southeastern Pennsylvania and southern New Jersey; *A. nantucketensis* isolated on Nantucket, more than 250 miles to the northeast; *A. lucida* endemic in Nova Scotia, another 250 miles farther to the northeast. This disruption of range suggests derivation in the North off the now submerged continental shelf, a derivation evident in many scores of other cases.

Campylium Halleri in New Brunswick.—The canyon at Grand Falls, N. B. still proves to be a good collecting ground especially in the hardly accessible places. Here, while working over a group of relatively dry ledges covered with *Hygrohypnum palustre* (Hedw.) Loeske, the writer again encountered *Hypnum fastigiatum* Brid. But of still greater interest was a near-by associate, a little golden-green *Campylium* with recurved leaves. Microscopical examination showed this to be *Campylium Halleri* (Hedw.) Lindb.: *Habeeb* 740, on relatively dry ledges in shade, Grand Falls, N. B., July 3, 1947.

The writer wishes to make the following correction. In the Acadian Naturalist, Vol. I, No. 4 of Nov. 1944 page 189, the writer listed *Leptodictyum trichopodium* (Schultz) Warnst. var. *Kochii* (B. S. & G.) Broth. This should have been *Campylium radicale* (Beauv.) Grout.

The species of *Campylium* collected so far by me in the vicinity of Grand Falls are *C. chrysophyllum* (Brid.) Bryhn, *C. Halleri* (Hedw.) Lindb., *C. hispidulum* (Brid.) Mitt., *C. hispidulum* var. *Sommerfeltii* (Myrin) Lindb., *C. polygamum* (B. S. & G.) Bryhn, *C. radicale* (Beauv.) Grout, and *C. stellatum* (Hedw.) Lange & C. Jens.—Herbert Habeeb, Grand Falls, New Brunswick.

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